
Specifications:

The Vendor will be required to attend a pre-bid meeting of vendors at the Disability Determination Service Building in Birmingham at the time established by the Disability Determination Service to view the areas in which work is to be done and to gain an understanding of the bid requirements.

A signed statement of attendance at this pre-bid meeting must be submitted with the bid. Authorized signers on this statement include Disability Determination Employees: Kari Yeager, Don Chapman, Ronnie Sutton, or Tommy Warren.

The vendor agrees to carry and keep in full force at all times the following insurance: General Liability (Bodily Injury, Property Damage) with a minimum of \$1,000,000 for each occurrence and \$1,000,000 aggregate. This can be covered by the general liability by itself or together with the excess liability umbrella. The vendor will provide workmen's compensation insurance for his employees that is sufficient under the laws of the State of Alabama. The vendor shall furnish insurance certificates with the bid, or the bid may not be considered.

The vendor must have done business in the Jefferson/Shelby County Area for a minimum of five years.

The vendor must be licensed by the appropriate municipal, county, and state agencies prior to submission of the bid.

The vendor will submit a minimum of three (3) references, to include the names, addresses and telephone numbers of contacts from the Jefferson/Shelby County area where they have provided service.

The Disability Determination Service will not be responsible in any way for damage to or Loss of the vendor's equipment kept in or near the DDS property, or the vendor's employees personal belongings brought onto DDS premises; occasioned by fire, theft, accident or otherwise.

Note: Description Literature, Insurance Certificate, references, proof of licensure of business plus any supplemental information must be submitted with the bid or the bid may be rejected. Reference to any of the above submitted with a previous bid or on file with the purchasing division will not satisfy this requirement.

Scope of Work:

Add Isolated/Dedicated Ground electrical outlets, circuits, conduit, wire and panels as needed in the Disability Determination Service's Multiple Purpose room to house 26 employees, each with 1 computer and dual monitors.

All work to be done must meet Social Security Administration guidelines for SSA INTELLIGENT WORKSTATION/LOCAL AREA NETWORK (IWS/LAN) REQUIREMENTS FOR SITE PREPARATION IN DDS OFFICES (see attachment 1).

SSA INTELLIGENT WORKSTATION/LOCAL AREA NETWORK (IWS/LAN) REQUIREMENTS FOR SITE PREPARATION IN DDS OFFICES

PART 1 – GENERAL

1.1 BACKGROUND

The Social Security Administration maintains a network of computer systems equipment in its offices Nationwide to process information in managing the Federal program for which it has primary responsibility. This document provides general guidelines for preparing sites, electrically, to house DDS offices and the computer systems they require, and it sets out minimum power and data distribution requirements for the installation of SSA systems.

The Agency has an electrical design program in place to provide detailed drawings and specifications for the construction of individual sites. This document is intended for use by interested parties to plan ahead for the requirements of the detailed designs when they are received. In the event that the detailed construction documents are not available in time for incorporation into the construction process, this document will provide necessary guidance for design and construction.

1.2 SYSTEM CONFIGURATION

Each office must contain a securable space to house the central network control equipment. In the DDS this is a locked Data Communications Room (DCR). The DCR contains one or more equipment racks with the servers, routers, switches, and other miscellaneous equipment needed to manage the network. This room also houses the voice communications equipment and connections to the SSA wide area network.

SSA has recently converted its network data communications protocol from IBM's Token Ring specification to the open ethernet 100BaseT specification. In large or multi-story Field Offices where two or more telecommunications closets are necessary, the switches are installed in the closets, and fiber optic cable is used to interconnect the closets with the DCR.

Workstations, printers, facsimile machines, scanners, and miscellaneous other computer systems equipment comprise the remainder of the network equipment used in SSA offices. This equipment is employed at individual employees' furniture workstations and various other locations around the office.

1.3 DATA DISTRIBUTION REQUIREMENTS

Data distribution requirements are determined by the Federal Telecommunications Recommendations (FTR) as set forth by the National Communications System (NCR). Note that FTR 1090-1997, Commercial Building Telecommunications Cabling Standard, incorporates TIA/EIA 568, Revision B, 2003 in its entirety.

The contractor shall be responsible for providing a Category 6 compliant data channel from the patch panel in the DCR to the furniture or wall faceplate. All connections outside of these points (patch cables, PC adapter cables, etc.) are the responsibility of others. Category 6 compliance shall be determined by testing and the results compared to the TIA/EIA 568 standard and requirements set forth in this document.

1.4 POWER DISTRIBUTION REQUIREMENTS

All power distribution shall be installed in compliance with the latest version of the National Electric Code as published by the NFPA, and this document. All power for the DCR and the computer system workstations shall be provided from an IG-type distribution panel located in the DCR.

1.5 MECHANICAL REQUIREMENTS

The DCR shall be provided with mechanical equipment to maintain a temperature between 68 degrees and 78 degrees Fahrenheit. The HVAC system must be capable of maintaining ± 2 degrees F. of the thermostat setting. This condition must be maintained 24 hours a day, 7 days a week. HVAC shall be thermostatically controlled within the room and be independent of the "house" system. The equipment located in the DCR will be operational 24 hours a day, 7 days a week. Window-unit type air conditioners are not acceptable.

1.6 ABBREVIATIONS AND DEFINITION OF TERMS

DCR – Data Communications Room

EIA – Electronics Industry Association

FIPS PUB 94 - Federal Information Processing Standard, Publication 94

IG – Isolated Ground

NFPA – National Fire Protection Association

NEC – National Electric Code

STP-- Shielded, twisted pair cable generally meaning IBM Type 1 or Type 1A

TIA -- Telecommunications Industry Association

UTP -- Unshielded twisted pair cable

Branch Circuit- A branch circuit is an electrical circuit between a breaker in the panel board and receptacles or devices on the floor.

Feeder- A feeder is an electric circuit between the service equipment, such as a distribution board or a switch board, and a panel board.

Isolated Ground- In a branch circuit it is a separate, insulated grounding wire that runs from an isolated grounding-type receptacle (usually orange in color) to the panel box. It is connected to a special insulated separate ground strip or bus which is in turn connected by an insulated wire to the main building service ground, avoiding any contact with the conduit, electrical boxes, and neutral bus. This grounding conductor may pass through one or more panel boxes without any connection to the panel box grounding terminal. An IG should not run to an isolated earth ground or a water pipe.

Main Building Service Ground- The point at the electrical service entrance where the neutral of the incoming service or neutral of the service transformer is bonded to the service equipment ground.

Power, General Purpose- General Purpose circuits provide power for all tenet-use equipment not fed from IG circuits. These circuits shall not originate from any IG panels.

Provide- The contractor shall furnish and install.

The IG circuit will have one phase wire, one neutral wire, and one IG wire. Any general purpose circuits will have one phase wires, one neutral wire, and one safety ground wire.

1.7 REFERENCES

Conformance to the following is required under this specification.

A. FCC Regulations:

1. Part 15- Radio Frequency Devices& Radiation Limits
2. Part 68- Connection of Terminal Equipment to the Telephone Network

B. FIPS PUB 94 - Federal Information Processing Standard 94, See FTR

C. FTR 1090-1997 - The National Communication System is now responsible for issuing and maintaining information relating to the Federal Government's communications standards. FIPS PUBs have been superceded by a system of Federal Telecommunications Recommendations. Specifically, FTR 1090-1997, Commercial Building Telecommunications Cabling Standard, outlines requirements for the installation of structured cabling systems in Federal buildings.

- D. NEC - The National Electric Code (NEC) is published by the National Fire Protection Association (NFPA) and is part of most building codes. Compliance with the latest edition of this code is mandatory for electrical installation to safeguard persons and property from hazards arising from the use of electricity. Some local building codes may also have additional requirements.
- E. National, State, Local and any other binding building and fire codes.
- F. TIA/EIA 568 – Commercial Building Telecommunications Cabling Standard, Revision B, February 2003.
- G. TIA/EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
- H. TIA/EIA 606 - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- I. Underwriter's Laboratories (UL): Applicable listing and ratings.

PART 2 – PRODUCTS

2.1 POWER

A. General

1. Provide products, for which quantities of two or more are to be furnished, from the same manufacturer and of the same product or model series.
2. Provide product components designed to be used together and which are physically and electrically compatible. Where component products are added to existing assemblies, provide products that electrically match existing (e.g., provide circuit breakers added to existing panelboards with voltage, AIC rating, and mounting style to match existing).
3. Provide products that do not contain any amounts of polychlorinated biphenyl (PCB) compounds.
4. Provide products that do not contain any amounts of asbestos.

B. Isolated Ground Panelboard

Provide isolated ground panelboard (to be identified as RP-G) with the following features:

1. 208Y/120 volt, 3-phase, 4-wire with fully rated neutral bus and separate copper ground and isolated ground buses.
2. Minimum short-circuit rating of 10,000 RMS amperes.
3. Main circuit breaker, minimum ampacity equal to 125 percent of the total connected load as called for in this package and shown on the approved floor plans plus 25 percent space capacity based on equipment loads as listed in the table below.
4. Bolt-on type, 20 ampere, molded-case branch circuit breakers. Provide 20 percent spare breakers.
5. Typed circuit directory card matching the installed circuit layout.

C. Isolated Ground Panelboard Surge Suppressors

1. Provide surge suppressors modular design with field-replaceable modules and the following features and accessories:
 - a. Fuses, rated at 200-kA interrupting capacity.
 - b. Fabrication using bolted compression lugs for internal wiring.
 - c. Single suppression circuits.
 - d. Replaceable modules.
 - e. Direct bus bar connections, bolted to phase buses, neutral bus, and ground bus.
 - f. Individually fused MOV technology with single MOV for each suppression module. Fuse each phase of the surge current diversion module with 200k AIC surge rated fuses.
 - g. Surge current diversion paths between each phase conductor and the neutral conductor, between each phase conductor and the ground and between the neutral conductor and ground. For delta configured systems, connect the SPD components between each phase conductor and between each phase conductor and ground.
 - h. Copper bus bars for the surge current path. Do not use small gauge round wire or plug-in connections in the path for surge current diversion.
 - i. Red and green LED indicator lights for power and protection status.
 - j. Audible alarm, with silencing switch, to indicate when protection has failed.
 - k. One set of dry contacts rated at 5 Amps and 250-V AC, for remote monitoring of protection status.
 - l. Surge-event operations counter.
2. Peak Single-Impulse Surge Current Rating (kA): 200 per phase, 100 per mode. Designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.

3. Minimum EMI/RFI filtering of minus 50 dB at 100kHz.
4. Minimum 3,500 Impulses of repetitive surge current capacities per mode utilizing 1.2 x 50 micro-second 20 KV open circuit voltage, 8 x 20 micro-second 10 KA short circuit current Category C3 bi-wave at one minute intervals without suffering performance degradation or more than 10% deviation of clamping voltage at a the rated surge current capacity.
5. Protection modes for grounded wye circuits with voltages of 480Y/277, 208Y/120; 3-phase, 4-wire circuits, shall be as follows:
 - a. UL 1449 Second Edition Listed and Recognized Component Suppression Voltage Ratings shall not exceed the following:

Voltage	L-N	L-G	N-G
208Y/120	400	400	400
480Y/277	800	800	800

- b. The ANSI/IEEE C62.41 – 1991 Category B3 let through voltage shall not exceed the following:

Voltage	L-N	L-G	N-G
208Y/120	520	520	520
480Y/277	1300	1300	1300

6. Protection modes and UL 1449 clamping voltage for 240/120 V, single-phase, 3-wire circuits, shall be as follows:
 - a. Line to Neutral: 500 V.
 - b. Line to Ground: 500 V.
 - c. Neutral to Ground: 500 V.
7. Protection modes and UL 1449 clamping voltage for 240/120 V, 3-phase, 4-wire circuits, with high leg shall be as follows:
 - a. Line to Neutral: 500 V, 800 V from high leg.
 - b. Line to Ground: 500 V, 800 V from high leg.
 - c. Neutral to Ground: 500 V.
8. Protection modes and UL 1449 clamping voltage for 240V and 480V, 3-phase, 3-wire, delta circuits shall be as follows:

	480V	240V
Line to Ground:	1200	800

9. Minimum EMI-RFI Noise Rejection over the rated frequency range for single unit (multiple unit) installation(s):

- a. 34 dB (51dB) 100 KHz
- b. 51 dB (94dB) 1 MHz
- c. 54 dB (114dB) 10 MHz
- d. 48 dB (120dB) 100 MHz

10. Integral test port for off-line diagnostic testing of the unit's suppression filter system.

D. General-Purpose Panelboard

Provide general-purpose panelboard (to be identified as RP-A) with the following features:

- 1. 208Y/120 volt, 3-phase, 4-wire with fully rated neutral bus and separate copper ground bus.
- 2. Minimum short-circuit rating of 10,000 RMS amperes.
- 3. Main circuit breaker, minimum ampacity equal to the total load as called for in this package and shown on the approved floor plans, plus 25 percent spare capacity, sized per NEC requirements.
- 4. Not Used.
- 5. Bolt on type, 20 ampere, molded-case branch circuit breakers. Provide 25 percent spare breakers.
- 6. Typed circuit directory card matching the installed circuit layout.

E. Provide isolated ground (IG) duplex receptacles, orange colored, NEMA 5-20R, Hubbell IG 5362, Arrow Hart IG 5362, or equal.

F. Provide general-purpose duplex receptacles, ivory colored, NEMA 5-20R, Hubbell, Arrow Hart, or equal.

G. Provide building wire, THHN/THWN insulation, solid or stranded copper wire for No. 10 AWG and smaller; stranded copper wire for sizes No. 8 AWG and larger. Provide minimum size of No. 12 AWG.

H. Metal Clad Cable, 4 wire is permitted for IG circuits and 3 wire is permitted for general purpose.

I. Provide compression type or set screw type fittings for all conduit unions.

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- J. Type MC cable is allowed only if the cable contains **ALL** the conductors mentioned above including both the equipment grounding (EG) and isolated grounding (IG) conductors. **SSA DOES NOT CONSIDER ANY CONDUIT OR SHEATH A SUITABLE ISOLATED OR EQUIPMENT GROUNDING PATH.**

2.2 DATA

A. General

1. Provide a continuous single cable, homogeneous in nature for every cable run. Splices are not permitted.

B. Manufacturers

1. AMP, Belden, Berk-Tek, Fibertron, JDI, Leveton, Lucent Technology, Mohawk, Nordx/CDT, Ortronics, Panduit, Suttle, The Siemon Company.

C. Distribution Racks

Modular steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

1. Wall-Mounting: Aluminum, hinged wall bracket with provisions for power strip mounting.
2. Floor-Mounting: Steel, freestanding, modular, with vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.

D. Cable

1. Provide Intrabuilding backbone fiber optic cable meeting the following requirements:
 - a. Provide 6-strand or 12-strand multimode plenum cable as required by the project.
 - b. Provide cable suitable for indoor installations, in a plenum environment.
 - c. The fiber optic cable shall have the following rated tensile load: 150-lb. maximum rated load.
 - d. Color code fiber strands within each sheath to allow identification of each fiber (ANSI/ICEA Publication S-80-576, and EIA-230).

- e. Do not use materials in fiber optic cable that contain hydrogen in quantities that will increase light attenuation.
 - f. Passive fiber optic physical equipment and apparatus used in interconnecting and cross-connecting fiber optic cables shall possess a minimum fire resistant rating of UL94V-1.
 - g. Provide flame-retardant, low-smoke polyvinyl chloride (LS-PVC) jacketed cable sheath colored orange, NEC OFNP rated, and UL listed AS UL-OFNP/FT6.
 - h. Provide multimode fibers with a minimum bandwidth of 500/500 MHz/km at the 850 and 1300 nm wavelengths.
 - i. Provide multimode fibers with a maximum attenuation of 3.5/1.0 dB/km at the 850 and 1300 nm wavelengths.
 - j. Comply with TIA/EIA-568, Latest Revision performance requirements.
2. Provide horizontal Category 6 unshielded twisted pair (UTP) cable meeting the following requirements:
- a. Provide cable suitable for indoor installation.
 - b. Provide cable with 4 twisted pairs of insulated copper conductors per cable, 24 AWG solid copper, fully insulated with retardant low-smoke thermoplastic material, plenum NEC CMP rated, and UL listed as such.
 - c. Color code twisted pairs individually, within color coded bundles, to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).
 - d. Comply with TIA/EIA-568-B performance requirements for Category 6 UTP cabling
 - e. Not used

E. Patch Panels

1. Backbone Cabling Multimode Fiber Optic Patch Panels

- a. Provide fully assembled rack mounted enclosed housing for protecting, storing and organizing the termination of the fiber optic cable including mounting components, and accessories such as connector panels, labels, etc. for a complete installation. Provide patch panel with an integrated patching facility.

- b. Provide panel with the following characteristics:

Strain relief and support of the specified cables.

Slack storage facilities for fiber slack.

A minimum of twenty-four fiber terminations.

Patch cord management.

2. Horizontal Cabling Patch Panel (DCR) Rooms)

- a. One-piece steel construction, modular or punch-down type, suitable for rack mounting, with factory-applied black baked enamel finish, with devices, junction fittings and other matching accessories as required for a complete Category 6 system and per UL 5.

- b. Minimum of 24 with 20% spare

F. Connectors

- 1. Backbone cabling multimode fiber optic connectors shall be type MTRJ.

2. Category 6 Modular Connectors

- a. 8 position modular connector, Category 6 rated, T568-A wired.

G. Cable Management and Support

1. Wire Mesh Cable Tray

- a. Provide welded steel wire mesh cable tray with a 50-mm (2-inch) by 100-mm (4-inch) mesh size and a minimum wire diameter of 0.197-inches.
- b. Provide cable tray dimensions of 50-mm (2-inches) usable load depth by 300-mm (12-inches) wide.
- c. Construct units with rounded edges and smooth surfaces, hot-dipped galvanized after fabrication.
- d. Provide connector assemblies, clamp assemblies, connector plates, etc as needed for a complete installation.

2. J-Hook Cable Support System

- a. Provide J-hooks rated to support Category 6 cable and optical fiber cable, mounted 1500-mm (5-feet) on-center for support of horizontal cabling. Do not exceed 40 percent fill ratio.
- b. Provide J-hooks with galvanized steel construction and 90 degree rolled safety edges.
- c. Provide latched retainers to contain cables within the hook area.
- d. Provide J-hooks with a static load capacity of 30 pounds per hook and fastener hole that accepts 6-mm (1/4-inch) bolts.

H. Innerduct and Accessories

1. Suitable for installation in plenum areas, with a 40-mm (1-1/2-inch) nominal inner diameter.
2. Provide corrugated innerduct with a polyethylene pull rope (minimum pull tension rating of 1,200 lb) pre-installed for the installation of cable.
3. Provide each innerduct continuous and uniquely colored for identification.

I. Labels

1. Backbone Cables

- a. Provide self-laminating adhesive labels, machine printable with a laser printer suitable for cable diameters installed.
- b. Printable Area: 50-mm (2-inches) by 12-mm (1/2-inch).
- c. Color: White

2. Horizontal Cables

- a. Provide self-laminating adhesive labels, machine printable with a laser printer suitable for cable diameters installed.
- b. Printable Area: 50-mm (2-inch) by 12-mm (1/2-inch).
- c. Color: White

3. Faceplates

- a. Provide faceplate labels for all outlet faceplates, machine printable with a laser printer.

- b. Color: White
- 4. Outlets and Patch Panel
 - a. Provide labels for data cable termination locations, machine printable with a laser printer.
 - b. Color: White

J. Miscellaneous Components

1. Velcro Cable Ties

- a. Provide Velcro cable ties applied, 18-mm (¾-inch) with a minimum 50-mm (2-inch) overlap.

PART 3 – EXECUTION

3.1 Electric Power Installation- General

- A. Install electrical equipment and accessories in accordance with the National Electrical Code and all local codes and ordinances.
- B. Install branch circuiting in electrical metallic tubing (EMT), minimum size ¾". Install no more than three homeruns per conduit.
- C. Install wiring for power feeders, branch circuits and communications systems in separate raceways unless otherwise indicated. Do not install isolated ground and non-isolated ground circuits in the same conduit.
- D. For non-isolated ground circuits provide one equipment ground wire per conduit run.
- E. For isolated ground circuits provide one neutral and one isolated ground wire for each circuit. In addition, provide one equipment ground wire per conduit run.
- F. Metal-clad cable, Type MC, may be installed recessed in walls if all neutral wires, isolated ground wires and equipment ground wires as listed above are contained in the cable.
- G. Provide color coding on 208Y/120 volt feeders and branch circuits as follows:
 - Phase A - black
 - Phase B - red

- Phase C - blue
- Neutral - white (with a red color trace)
- Ground - green
- Isolated Ground - Green with yellow bands or stripes. Solid green wire with yellow tape at splice/termination points is not acceptable.

H. Provide color coding on 480Y/277 volt feeders and branch circuits as follows:

- Phase A - brown
- Phase B - orange
- Phase C - yellow
- Neutral - white
- Ground - green

I. NECA Compliance

1. Install products in accordance with NECA's Standard of Installation unless otherwise specified or indicated.

J. Wet, Damp, or Dry Location Work

1. Provide products as appropriate for wet, damp, or dry locations as defined by NFPA 70.

K. Manufacturer Installation Instructions

1. Install equipment in accordance with the manufacturer's installation instructions and recommendations.

L. Fire and Smoke Barrier Penetrations

1. Drill wall and floor openings for penetrations as needed.
2. Install raceways and electrical equipment, which penetrate fire-rated or smoke barrier surfaces, in a manner which maintains the surface rating or barrier intent.

M. Field Painting

1. In a manner satisfactory to the Contracting Officer, touch-up or refinish factory-applied paints or finishes which are chipped, defaced, scratched, or in any other way disturbed due to handling, installation, or general construction work.

3.2 Isolated Ground Power

- A. Install RP-G in the DCR room. Do not locate the panelboard in the zone identified for the LAN rack. Do not locate other non-IG panelboards in the DCR Room.
- B. Provide a power feeder to the panel, consisting of three phase conductors, one full-size neutral, one equipment ground (minimum No. 6 AWG) and one isolated ground conductor (minimum No. 6 AWG).
- C. The isolated ground conductor feeding RP-G must originate from either the building service ground or the neutral/ground bond of the local 208Y/120 volt transformer feeding RP-G and it must be run inside the feeder conduit. Provide one continuous isolated ground conductor from point of origin to RP-G.
- D. Provide isolated ground branch circuiting to isolated ground (IG) duplex receptacles in IWS/LAN systems furniture workstations. Connect a maximum of four workstations per 20-amp circuit. Provide an isolated ground (IG) duplex receptacle and isolated ground branch circuiting for each IWS/LAN workstation not associated with systems furniture. The approved floor plan will show the location and number of workstations.
- E. Provide an IG duplex receptacle and isolated ground branch circuiting for each IWS/LAN printer (LP or DP) . The approved floor plan will show the location and quantities.
- F. Provide two IG duplex receptacles, and isolated ground branch circuiting for each LAN rack shown on the approved floor plan. Connect both receptacles to the same phase but on separate dedicated circuits.
- G. All the receptacles for the computer equipment shall be isolated ground (IG) type and shall meet requirements of NEC 250-74 Exception No. 4.
- H. Adhere to the following for maximum number of isolated ground receptacles per circuit and connection criteria. Maximum load per circuit is 16 amps.

EQUIPMENT	LOAD (Amps)	MAXIMUM PER CIRCUIT	ALLOWABLE CONNECTION
			CRITERIA
Workstation	2.0	4	Only with other workstations
Laser Printer	7.8	2	Only with other printers
			Dedicated Circuit
LAN Rack	12.0	1.0	Two dedicated circuits

- I. Label each isolated ground receptacle with the panel designation and circuit breaker number it is connected to (e.g. "G-14"). Place typed, self-adhesive label on receptacle faceplate. Handwritten labels are not acceptable. Identify each breaker at the panel and the devices it serves on the circuit directory.

3.3 General Purpose Power

- A. Install panel(s) within DDS controlled space preferably in the electrical closet serving the floor(s) DDS occupies.
- B. Provide additional standard electrical circuits and install receptacles as shown on the approved floor plan.
- C. Other building general purpose receptacles, mechanical loads and lighting may be connected to RP-A

3.4 Data Installation

A. General

- 1. Install work in a neat, high quality manner and conform to applicable federal, state and local codes.
- 2. Repair or replace work completed by others that is defaced or destroyed.
- 3. Install cables in a manner to protect the cable from physical interference or damage.
- 4. Do not exceed manufacturer's minimum allowance for bend radius of the cable.
- 5. Do not exceed manufacturer's maximum allowance for pulling tension on cable.
- 6. Ground all racks and other such components to the EG bus with a minimum #6AWG wire.

B. Installation

- 1. Backbone Innerduct Pathway
 - a. Install cables without kinks, twists, or impact damage to the sheath

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- b. Install cables continuous and with sheath continuity
 - c. Do not use oil, grease, or similar substances to facilitate the pulling of cable. Use a UL approved cable pulling compound.
 - d. When not in innerduct, properly route cable and fasten to a cable support device, such as cable runway vertically mounted on the wall.
 - e. Install cables in innerduct on the vertical cable ladder when rising through the DCR room. Provide cable ties 600-mm (24-inches) on-center to support the innerduct.
 - f. Route cable through destination DCR room on cable tray to the fiber optic patch panel. Route cables inside the cable tray wherever possible, unless otherwise approved by the Engineer or Contracting Officer in writing prior to installation.
 - g. Provide strain relief at the patch panels for cables, per the manufacturer's instructions.
 - h. Provide fully assembled fiber optic patch panel in the cross-connect field, as indicated.
 - i. Provide accessories required for each shelf, including connector panels and adapters.
 - j. Terminate fiber strands at both ends with MTRJ connectors
 - k. Replace fibers and terminations damaged during installation.
 - l. Terminate multimode strands with multimode connectors.
 - m. Provide the accessories and consumables required for the complete termination of fibers.

2. Backbone Fiber Optic Cable

- a. Install cables without kinks, twists, or impact damage to the sheath
- b. Install cables continuous and with sheath continuity.
- c. Do not use oil, grease, or similar substances to facilitate the pulling of cable. Use a UL approved cable pulling compound.
- d. When not in innerduct, properly route cable and fasten to a cable support device, such as cable runway vertically mounted on the wall.

Install cables in innerduct on the vertical cable ladder when rising through the DCR room. Provide cable ties 600-mm (24-inches) on-center to support the innerduct.

- e. Route cable through destination DCR room on cable tray to the fiber optic patch panel. Route cables inside the cable tray wherever possible, unless otherwise approved by the Engineer or Contracting Officer in writing prior to installation.
- f. Provide strain relief at the patch panels for cables, per the manufacturer's instructions.
- g. Provide fully assembled fiber optic patch panel in the cross-connect field, as indicated.
- h. Provide accessories required for each shelf, including connector panels and adapters.
- i. Terminate fiber strands at both ends with MTRJ connectors.
- j. Replace fibers and terminations damaged during installation.
- k. Terminate multimode strands with multimode connectors.
- l. Provide the accessories and consumables required for the complete termination of fibers.

3. Horizontal Cable

- a. Support station cables exiting the DCR room 1500-mm (5-feet) on-center using J-hook cable hangers.
- b. Do not exceed 90 meters (300-feet) in length from the termination at the user's faceplate to the termination at the DCR room.
- c. Enter LAN rack from the top..
- d. Provide a minimum of 150-mm (six-inches) of slack sheathed cable behind each station outlet faceplate. Coil the slack cable inside the junction box or raceway as per the cabling manufacturer's installation standards.
- e. Route cables in vertical cable tray in DCR room.
- f. Route cables a minimum of 150-mm (6-inches) away from power sources to reduce interference from EMI.

- g. Install cables with sufficient bending radius so as not to break or kink, shear or damage binders, or to interfere with transmission in any way.
- h. Neatly dress and organize cables in the cable tray. Bundle cables sequentially into groups of 12. Wrap every 600-mm (24-inches) with Velcro cable ties as required. Do not tightly bundle cables together. Fasten cable to cable tray via Velcro-type straps.

Route cable homeruns, parallel and perpendicular to building structure allowing for bending radius, and along corridors for ease of access. Do not route cables through an adjacent space if a corridor borders at least one wall of the room.

- i. Route data cables from cable tray into the bottom of the LAN rack cabinet and terminate with specified jack into patch panel. Do not support cables to the outside of the cable tray.
- j. Provide permanent machine generated labels on each end of the cable no more than 100-mm (4-inches) from the edge of the cable jacket.
- k. Terminate cables with Category 6 modular connectors.

4. Patch Panels

- a. Install Category 6 patch panels into LAN rack as indicated.
- b. Coordinate with SSA for mounting requirements and install according to the manufacturer's instructions.
- c. Terminate data cable in accordance to manufacturer's instructions and TIA/EIA-568A standard installation practices.

5. Outlets and Connectors

- a. Provide station outlets with connectors.
- b. Provide permanent machine generated clear laminated labels on the front of each faceplate or surface box.

6. Installation of Cable Tray

- a. Install cable tray as indicated; in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.

- b. Coordinate installation with other work as necessary to properly interface with other work.
- c. Provide sufficient space around cable tray to permit access for installing and maintaining cables.

C. Records

1. Labeling

- a. Label the communication system components in conformance with TIA/EIA-606 Administration Standards, including, but are not limited to, the following:

Cables (both ends)

Innerduct (both ends).

- b. Permanently mark cable ends with machine-generated or stenciled (not handwritten) wrap-around labels with a self-laminating feature.
- c. Permanently mark components, such as racks and patch panels, with machine-generated labels.

2. Records

- a. Conform to TIA/EIA-606 Administration Standards containing as a minimum, the information as outlined in Table 4.7-1 of TIA/EIA-606.

D. Project Close-Out

1. Submit as-built drawings prior to final acceptance of system

- a. Scaled 1/2"=1'-0" floor plans of DCR rooms showing exact placement of LAN racks and termination hardware.
- b. Scaled 1/2"=1'-0" floor & overhead plans of DCR Rooms showing exact placement of all overhead cable support routes.
- c. Installation details.
- d. Provide data disks of each of the final as-built drawings prepared using AutoCAD software, fully representing actual installed conditions.

2. Test results. Contractor to be present for all testing.

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- a. Provide one copy of written and electronic test result documentation.
 3. Provide manuals for testing, operation and training including:
 - a. Prints of record drawings as described above.
 - b. Not used.
 - c. Provide manuals in a white, 3-ring binder with front cover and spine clear pockets for insertion of the manual name and project information. Manual shall be indexed with individual dividers.

E. Certification

Provide the Contracting Officer and SSA Office Manager with a written form of acceptance for signature. All corrections must be completed before acceptance is given.

